CLAIMS

1. A bistable nematic liquid crystal device comprising:
a first cell wall and a second cell wall enclosing a layer of nematic liquid crystal material;
electrodes for applying an electric field across at least some of the liquid crystal material;
a surface alignment on the inner surface of at least the first cell wall providing alignment to the liquid crystal molecules;
wherein the surface alignment comprises an array of features which have a shape and/or orientation to induce the director adjacent the features to adopt two different tilt angles in substantially the same azimuthal direction;
the arrangement being such that two stable liquid crystal molecular configurations can exist after suitable electrical signals have been applied to the electrodes.

2. A device as claimed in claim 1, wherein the liquid crystal material has negative dielectric anisotropy and wherein the second cell wall has a surface alignment which induces a local homeotropic alignment of the director.

3. A device as claimed in claim 1, wherein the features are posts.

4. A device as claimed in claim 1, wherein the features have a height in the range 0.5 to 5 μm.

5. A device as claimed in claim 1, wherein the features have a height in the range 0.9 to 1.3 μm and

the spacing between the cell walls is about 3 μm.

6. A device as claimed in claim 3, wherein at least part of the side wall of the posts is tilted with respect to the normal to the plane of the first cell wall.

7. A device as claimed in claim 6, wherein the tilt angle is in the range 5 to 7°.

8. A device as claimed in claim 6, wherein the tilt angle is about 5°.

9. A device as claimed in claim 1, wherein each feature has a width in the range 0.2 to 3 μm.

10. A device as claimed in claim 1, wherein the features are arranged in a random or pseudorandom array.

11. A device as claimed in claim 1, wherein the features are spaced from 0.1 to 5 μm apart from each other.

12. A device as claimed in claim 1, wherein the liquid crystal material contains a surfactant.

13. A device as claimed in claim 1, wherein the features are formed from a photoresist or a plastics material.

14. A device as claimed in claim 1, further including an analyser and a polariser mounted on the cell walls.

15. A device as claimed in claim 1, wherein the features are not treated with or formed from a material

which induces homeotropic alignment in liquid crystal materials.

16. A device as claimed in claim 1, wherein the surface alignment on the second cell wall comprises an array of features which have a shape and/or orientation to induce the liquid crystal director adjacent the features to adopt two different tilt angles in substantially the same azimuthal direction.

17. A device as claimed in claim 1, wherein the liquid crystal material has a pleochroic dye dissolved therein.

18. A device as claimed in claim 1, wherein the shape and/or orientation of the features is such as to favour only one azimuthal director orientation adjacent the features, and this orientation is the same for each feature.

19. A device as claimed in claim 1, wherein the shape and/or orientation of the features is such as to favour only one azimuthal director orientation adjacent the features, and this orientation varies from feature to feature so as to give a scattering effect in one of the two states.

20. A device as claimed in claim 1, wherein the inner surface of the second cell wall is provided with an alignment which induces the local liquid crystal director to adopt a planar alignment in substantially the same azimuthal direction induced by the alignment on the surface of the first cell wall.

21. A device as claimed in claim 1, wherein the liquid crystal director twists between the first cell wall and

the second cell wall.

22. A device as claimed in claim 21, wherein the twist is induced by chiral doping of the liquid crystal material.

23. A device as claimed in claim 21, wherein the twist is induced by treatment of the second cell wall to produce a planar or tilted planar alignment of the local liquid crystal director at a non-zero angle to the azimuthal direction induced by the features on the first cell wall.